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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,805	01/13/2004	Yi-Nan Chen	NTCP0027USA	1804
27765	7590	03/20/2006	EXAMINER	
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116			GEBREMARIAM, SAMUEL A	
			ART UNIT	PAPER NUMBER
			2811	

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/707,805	Applicant(s) CHEN ET AL.	
	Examiner Samuel A. Gebremariam	Art Unit 2811	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 December 2005.
- 2a) ☐ This action is FINAL.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 9-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION*****Drawings***

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the limitation of "other conductive elements positioned above the storage node" must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

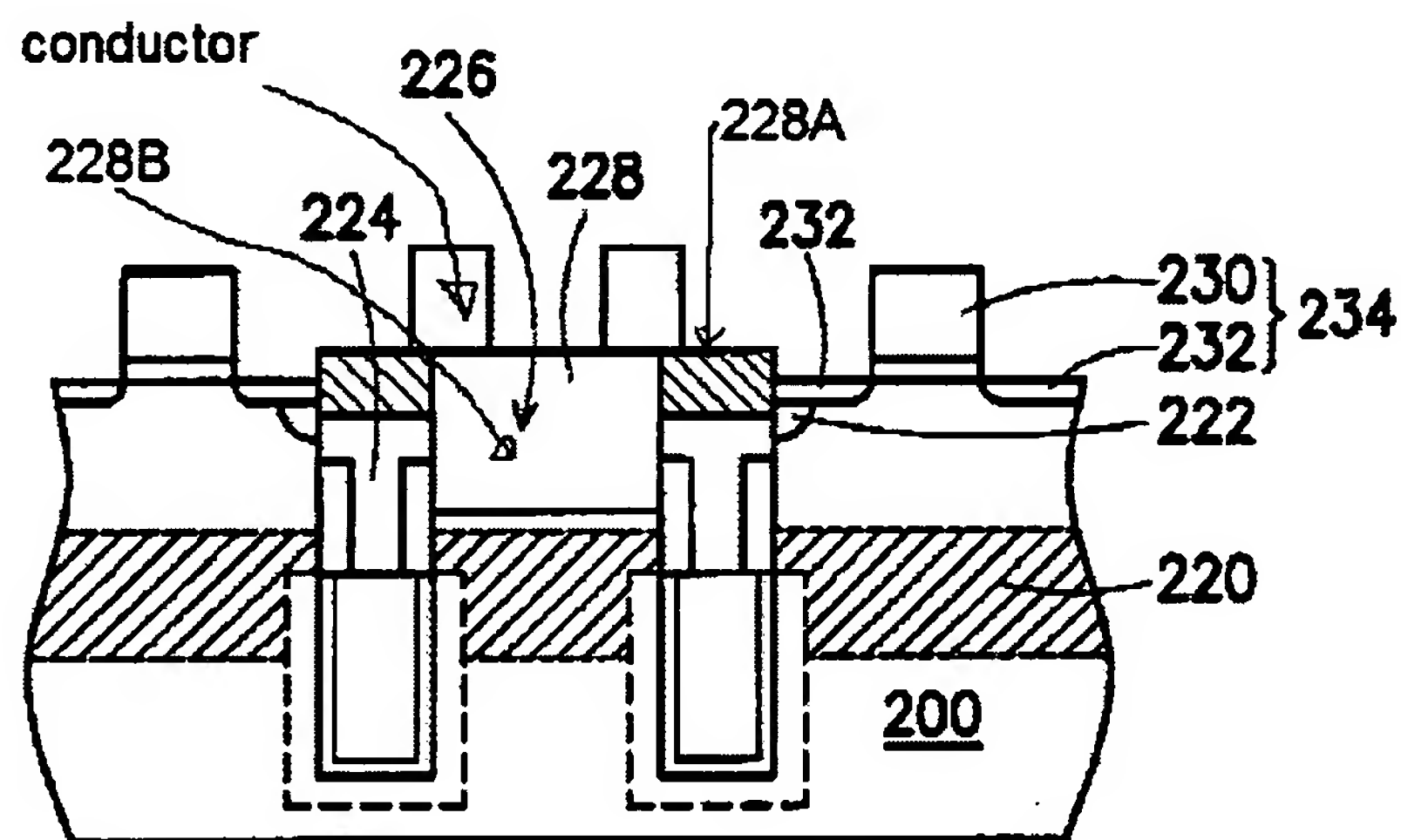
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Wu et al., US patent No. 6,281,069.

Regarding claim 1, Lee teaches (figs. 2A-2E and refer to the insert) an isolation structure (228) of a trench capacitor (col. 3, lines 39-42), the trench capacitor being disposed in a deep trench (210) of a substrate (200) and comprising: a storage node (214,224) serving as a top plate of the capacitor in the deep trench (210); a bottom plate buried (216) in the substrate around the deep trench (210); a capacitor dielectric layer (212) positioned between the storage node (214) and the bottom plate (216), on a sidewall of the deep trench, the storage node (214) the bottom plate (216) and the capacitor dielectric (212) forming storage capacitance; and a collar oxide layer (218) disposed on the sidewall of the deep trench (210), the isolation structure (228) comprising (fig. 2E): a first isolation portion (228A on both sides) directly contacting and completely covering the top surface of the storage node (214,224) to separate and isolate the storage node from other conductive elements (conductor element above 224) positioned above the storage node (refer to the figure below), the first isolation portion (228A on both sides, refer to the insert) completely filling a top opening of the

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deep trench (210) and, having a first thickness (the depth of 228A); and a second isolation portion (228B) directly contacting the first isolation portion (refer to figure below) and surrounding the deep trench without overlapping the deep trench (refer to figure below), the second isolation portion having a second thickness larger than the first thickness (the depth of 228B is larger than 228A), the second isolation portion (228B) directly contacting and positioned beside and adjacent to both a top portion of the storage node (224) and a top portion of the collar oxide layer (218, refer to fig. 2E).



Regarding claim 2, Wu teaches the entire claimed structure of claim 1 above including the second isolation portion (228B) is disposed by a side of the collar oxide layer (218), near the storage node (224) and the collar oxide layer (218) without being located on the storage node (224) and the collar oxide layer (218, fig. 2E).

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Regarding claim 3, Wu teaches the entire claimed structure of claim 1 above including that a bottom of the second isolation portion (228B) is lower than a top of the top portion of the collar oxide layer (218) it contacts (refer to fig. 2E).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu in view of Alsmeier US patent No. 5,867,420.

Regarding claim 4, Wu teaches substantially the entire claimed structure of claim 1 above except explicitly stating the isolation structure further comprising an isolation liner disposed between the first isolation portion and the conductive layer, the second isolation portion and the conductive layer, and the second isolation portion and the collar oxide layer.

Alsmeier teaches the use of liner structure (fig. 2d, liner 255, and col. 4, lines 45-62) in the formation of an isolation structure in a trench capacitor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the liner structure taught by Alsmeier in the device of Lee in order to prevent oxygen diffusion from the trench isolation to the device region.

The combined structure of Wu and Alsmeier would inherently teach the isolation structure having an isolation liner disposed between the first isolation portion and the

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conductive layer, the second isolation portion and the conductive layer, and the second isolation portion and the collar oxide layer.

Regarding claim 5, Wu teaches substantially the entire claimed structure of claim 1 above including the isolation liner comprises a nitride liner (col. 4, lines 45-62).

Regarding claim 6, Wu teaches substantially the entire claimed structure of claim 1 above including the isolation liner comprises an oxide liner (col. 4, lines 45-62).

6. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu in view of Lee, US patent No. 6,514,816.

Regarding claims 7 and 8, Wu teaches the entire claimed structure of claim 1 above including the first isolation portion and the second isolation portion are insulating layers (col. 5, lines 15-18).

However Wu does not explicitly state that the insulating layer is an oxide.

It is conventional and also taught by Lee filling an STI structure using an oxide layer (col. 4, lines 35-44).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the oxide layer taught by Lee in the structure of Wu in order to form an isolation structure.

The limitation of "the first isolation portion and the second isolation portion are oxide layers formed by a high density plasma chemical vapor deposition (HDPCVD) process" is considered a product-by-process claim. "[E]ven though product-by process claims are limited by and defined by the process, determination of patentability is based



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on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1-8 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Gebremariam whose telephone number is (571) 272-1653. The examiner can normally be reached on 8:00am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAG  
March 15, 2006



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